

GRESHAM OR COPERNICUS?*

The famous Polish astronomer Nicholas Copernicus (1473-1543) wrote besides astronomical works, and in particular the epochal *De revolutionibus orbis celestium, Libri VI*, several significant economic treatises. The most valuable among them are those dealing with money, namely *De estimatione monete* which appeared in 1519, as well as *Monete cudende ratio, Libri VI* (On the Principle of Coining Money), known also under the title *De monetae cudendae ratione*, written in 1526.

The latter work, which was written at the request of the Polish king Sigismund I, placed Copernicus in the forefront of the European economists of the period. It is a succinct but brilliant treatise on money, containing principles and theories which have survived centuries and have not lost their applicability till the present day. It contained especially the explanation of a basic economic principle, *viz.*, that of two currencies with equal legal tender existing in the same country, the bad one forces out of circulation the good one. By some scientific misunderstanding this principle was for many decades attributed to Thomas Gresham and is still known as Gresham's Law of Coinage.

In order properly to understand the historical and economic background of Copernicus' work it should be mentioned that the kings of Poland strenuously endeavored to maintain a good and stable currency. Thus the oldest preserved collection of Polish laws, *i.e.*, the so-called *Wiślica Statute of King Casimir the Great of 1347*, contains the following provision:

As there is one ruler and master, we decree, on the advice and with the consent of our barons and dignitaries, that in our entire realm there ought to be one currency which should be perpetual and good in value and weight so that for this reason it be more agreeable and acceptable to others.¹

*Excerpt from a forthcoming book on *Polish Economic Thought through the Ages*.

¹ *Volumina Legum*, vol. I, p. 43. *Volumina Legum* is the title of a most exhaustive collection of laws (statutes, constitutions, royal edicts, privileges) of the Polish Commonwealth till the partitions. Started in 1732, it covers in XI Volumes the period from the Statute of *Wiślica* till the enactments of the Polish Diet of 1792. Initially a private publication it obtained the character of an official collection in 1809. Out of print already at the beginning of the 19th century, the first edition is now a great rarity.

The Law Library of Columbia University in New York City possesses the whole set of the first edition. These books together with the original Index, bearing the quite uncommon label *Ex Bibliotheca Regis Poloniae* (From the Library of the King of Poland), are gathering dust in the basement of Kent Hall.

For various reasons these endeavors were not always successful. Poland was subject to the general European currency fluctuations. Consequently, in case of the deterioration of the currency in adjoining countries, particularly in Germany, foreign merchants as well as special emissaries gathered up good Polish coins, at the same time flooding the country with bad foreign money.

In addition, the kings, unable to find coverage for their considerable expenses for maintaining troops and waging wars, resorted to increasing money circulation by minting inferior coins.

A proof has been preserved that King Stephen Batory (1575-1586) rejected such a plan of obtaining funds for war against Muscovy by worsening the currency. The king wrote in a letter of March 9, 1579, to hetman Chodkiewicz:²

"Nolumus vili moneta, nos viles reddere. Eat ille Germanus ad quaerentes levamen inopiae lachrimis miserabilium." (We do not want to vilify ourselves by debasing the currency. Let this German go to those who seek relief from want of money through the tears of the poor.)

The first reformer of Polish currency on a large scale was King Sigismund I (1506-1548) who improved and stabilized Polish money by introducing a uniform monetary system at the Piotrków Diet, in 1526, and by issuing coinage regulations providing for the minting of money in strict accordance with the prescribed alloy and weight.

Moreover by royal decree of 1528 he introduced gold currency, ordering the coinage of red Polish zlotys³ of gold of a very high purity of 23 carat 4 grains, i.e. in accordance with the alloy used in minting Hungarian ducats and Dutch florins.

The King's endeavors were thwarted by the financial policy of the Teutonic Knights of East Prussia. The Order had begun to decline soon after the defeat it had suffered in its war with Poland at the Battle of Grunwald in 1410. One of the symptoms of decline was the counterfeiting and worsening of money to meet the Order's growing needs.

This had an unfavorable effect on Polish money and was a great obstacle in King Sigismund I's plans to improve and unify the Polish currency.

Therefore the king conducted for many years unsuccessful negotiations with the Order with a view to improving its minting conditions. In the peace terms submitted to the Grand Master Albrecht in 1519 (i.e. in the same year in which Copernicus wrote his treatise *De*

² Tadeusz Czacki, *O litewskich i polskich prawach* (On Lithuanian and Polish Laws), 2 vols., Warsaw 1800-1801, vol. I, p. 141.

³ In Poland, like in other European countries, gold money was called red; silver money—white, while small, mostly copper coins—black.

estimatione monete) the king of Poland demanded that the Order stop coining money without the consent of the Polish Crown. However Albrecht rejected this demand.

In 1525 the Order's last Grand Master Albrecht von Brandenburg Hohenzollern embraced Protestantism. Subsequently, already as a secular prince he rendered King Sigismund I a solemn homage in the market square of Cracow and obtained from him East Prussia as a fief of the Hohenzollerns under the Polish Crown. Albert Hohenzollern was granted autonomous minting rights, however he agreed to stop coining money until it would be brought into agreement with the Polish minting rate.

In this connection King Sigismund I commissioned Copernicus to write the treatise *De monetæ cudendæ ratione*, which became the first monument of Polish economic thought.

Criticizing the monetary policy of the rulers of Prussia who in order to increase their treasury, began adding more and more copper to the gold and silver coins minted by them, Copernicus explained in terms of economics the phenomenon of the disappearance of good coins from circulation as a consequence of which the currency was becoming gradually worse, and clearly formulated the principle that in case of the existence in one and the same territory of two kinds of currency the inferior one must drive the good one out of circulation.⁴

However, this doctrine is not known in economics under the name of its actual creator Copernicus, but it is called Gresham's Law of Coinage. For an explanation of this scientific mystification the following historical reference may be appropriate.

The first historically recorded debasement of money was effected at Athens by Solon in 594 B.C. to redeem the poorer citizens from debt and to remedy the distress caused by the introduction of coined money and high rates of interest. Solon devalued the drachma by about one quarter.

Though some, as Androtion, affirm that the debts were not canceled, but the interest only lessened, which sufficiently pleased the people, so that they named this benefit the *Seisacthea*, together with the enlarging of their measures and raising the value of their money; for he (Solon) made a pound which before passed for seventy-three drachmas, go for a hundred, so that though the number of pieces in the payment was equal, the value was less; which proved a considerable benefit to those that were to discharge great debts. But most agree that it was taking off the debts that was called *Seisacthea*, which is confirmed by some places in his poem, where he takes to himself, that

⁴ "Quanto hic magis erratum est vetere meliore remanente viliorum novam introducendo, quæ non solum infecit antiquam, sed, ut ita dixam, expugnavit."

"The mortgage stones that covered her, by me
Removed,—the land that was a slave, is free."⁵

About two centuries later during the Peloponnesian War the Spartans seized Decelea in Attica in 413 B.C. and because of this the Athenians could not work their silver mines at Laurium in this region, so that the old silver coinage, recognized far and wide as the best, had to be replaced. First, gold was turned into coin but the gold coins were soon debased and during the archonship of Callas (406-405 B.C.) copper coins, or strictly speaking, bronze coins were for the first time issued from the Athenian mint.

This deterioration of the Athenian currency and the disappearance of the good coins was complained of severely by Aristophanes in his play *The Frogs*, produced for the first time in 405 B.C.

The verbatim translation of the pertinent passage (Chorus, lines 716 ff.) runs as follows:

It has often seemed to us that our state has behaved just in the same way with respect to the honorable and the base among our citizens, as it has with respect to the ancient currency and the new gold mintage; for on the one hand we make no use of these coins which have not a trace of adulteration, but are the finest, as it would seem, of all coins, and the only ones properly struck, and tested for genuine among Greeks and barbarians all over the world — but instead thereof we use those vile copper bets, struck only the other day with the very worst stamp.⁶

In the middle ages it was Bishop Nicole Oresme of Lisieux in France (ca. 1320-1382) who in his treatise: *Tractatus de origine et natura, jure et mutationibus monetarum*, translated into French by the author himself under the title *Traictie de la première invention des monnoies*, published probably between 1356-1361, explained the economic role of money, severely condemning the debasing of its value.

Two hundred years later Sir Thomas Gresham (1519-1579), who later became chancellor of England, submitted in 1558 to the young Queen Elizabeth a memorial entitled "Information of Sir Thomas Gresham, Mercer, towching the Fall of Exchaunge." The memorial contained suggestions for the improvement of the English exchange the devaluation of which Gresham rightly attributed to the machinations of Henry VIII, the queen's father, in minting debased gold coins.

Gresham wrote in his memorial:

Itt may please your majesty to understande, thatt the first occasion off the fall of the exchaunge did growe by the Kings majesty,

⁵ "Solon" in *Plutarch's Lives*, Dryden's translation, Boston 1904, vol. I, pp. 116-167.

⁶ Translation by W. W. Merry, Oxford: Clarendon Press, 1905.

your latte ffather, in abusinge his quoyne ffrome VI ounces fine to III ounces fine. Whereuppon the exchange ffell ffrom XXVI s VIII d to XIII s IVd, which was the occasion thatt all your ffine gold was conveyed ought of this realme.⁷

However, leaving aside the fact that Gresham's memorial was written in 1558, i.e. 32 years after the publication of Copernicus' treatise, so that the latter possesses at least a chronological priority, Gresham's memorial deals only with the deterioration of exchange and not with the flight of good currency, and, like in the case of other writers of the time, it does not at all explain this phenomenon.

In 1857 the famous English economist Henry Dunning MacLeod published his work *Elements of Political Economy* in which, without knowing Copernicus' works and apparently only superficially familiar with Gresham's memorial, he wrote:

Aristophanes first noticed the fact at Athens that when a debased coinage was issued along with a good coinage, the good coins all disappeared from circulation, and the debased ones alone remained.⁸ This fact, which has been observed in all countries and ages, was long the puzzle of financiers and statesmen. Sir Thomas Gresham first explained the cause to Queen Elizabeth, hence we have called it Gresham's Law of Coinage.

MacLeod repeated the same statement in his works *The Theory of Credit*, London 1881, and *The Theory and Practice of Banking*, London 1892. Thanks to MacLeod's prestige and the popularity of his works the name "Gresham's Law of Coinage," introduced by him, became generally accepted in economics.

It was an Italian economist, August Montanari, who in his book *Elementi di economia politica*, Padua 1872, called attention to Copernicus' theory about the consequences of two currencies in the same territory, and devoted to Copernicus a special study *Nicoló Copernico ed il suo libro De monetae cudendae ratione*, Padua 1873 and 1877.⁹ But Montanari was less known than MacLeod and little regard was paid to his arguments. But later MacLeod's statement met with opposition on the part of other economic writers.

Thus *Palgrave's Dictionary of Political Economy* in its article on Gresham,¹⁰ as well as August Oncken in his work *Geschichte der Na-*

⁷ Copied from Annex XXI of *The Life and Times of Sir Thomas Gresham* by John William Burgon, London 1839.

⁸ The passage quoted from *The Frogs* does not warrant the attribution to Aristophanes of such a broad interpretation.

⁹ The second edition, Padua 1877, has an introduction by Doctor Artur Wolyński from Warsaw.

¹⁰ Robert H. J. Palgrave, Editor, *Dictionary of Political Economy*, London 1894—1899, Vol. II, p. 262: "We do not, however, find the principle stated in his (Gresham's) handwriting."

*tional Oekonomie*¹¹ came to the conclusion that in Gresham's memorial no formulation of the economic law can be found which was called "Gresham's Law" by MacLeod.

Subsequently Wilhelm Roscher and Louis François Wołowski¹² demonstrated the significance of Oresme and Copernicus for the development of monetary theory.

These studies, showing the incorrectness of MacLeod's views caused him to revise his stand. He did it very skillfully in his lecture read before the National Liberal Club, Political Economy Circle, in London on November 4, 1896, which was also published as a separate pamphlet under the title *The Law of Gresham and its Relation to Bimetallism*. In this he wrote:

At the instance of Sigismund I King of Poland, Copernicus drew up a masterly treatise on money which he entitled "Ratio monete cudende," which has only been discovered within the present century and is included in the magnificent edition of his works published at Warsaw in 1854.

Copernicus had no knowledge of the treatise of Oresme written 160 years before his time, but he came to exactly the same conclusions.

In England . . . the instant disappearance of the good coin as soon as it was issued from the mint was the subject of repeated debates in Parliament for some centuries and was an inscrutable mystery to financiers and statesmen. But they had no Oresme or Copernicus to explain it to them.

At last Sir Thomas Gresham was the first person in that country to explain that permitting bad coin to circulate was the cause of the disappearance of the good coin. I suggested in 1857 that this should be called Gresham's Law, which name has now been universally accepted. But, as Oresme and Copernicus had both declared the law before him, it ought to be called the law of Oresme, Copernicus and Gresham. (pp. 6-7).

Since, as has been previously said, neither Bishop Oresme nor Sir Thomas Gresham deal with the driving out of the good coin by the bad one, the scholar who first scientifically explained the phenomenon of disappearance of good coins is Nicholas Copernicus.

But in spite of the correction undertaken by MacLeod himself, the theory falsely ascribed to Gresham stuck so deeply in the minds of

¹¹ . . . weil man in der Folgezeit einen dogmatischen Satz (bad money drives out good money) mit seinem Namen verbunden hat, der unter dem Namen Greshamsches Gesetz in der politischen Oekonomie einen Platz erhalten hat. In den Handschriften Greshams hat man ihn vergebens gesucht." Dr. August Oncken, *Geschichte der National Oekonomie*, Vol. I, Leipzig 1902, p. 206.

¹² Wilhelm Roscher, *Principles of Political Economy*, 13th German edition, Berlin 1877. *Traicté de la première invention des monnoies de N. Oresme et Traité de la monnaie de Copernic*, publiés et annotés par M. Louis Wolowski, Paris 1864.

economists that it was even repeated by Joseph A. Schumpeter in his posthumously published work in the following words:

Second there is Gresham's Law, the proposition that if coins containing metal of different value enjoy equal legal tender power, then the "cheapest" ones will be used for payment, the better ones will disappear from circulation or, to use the usual but not quite correct phrase that bad money drives out good money.¹³

Although not directly connected with the theory that bad money drives out good money, it is noteworthy that in the very same work *De monetae cudendae ratione* Copernicus rejected the medieval doctrine that high prices are caused by the exploitation practised by merchants, a principle based on a canonical theory about the just price (*justum pretium*) and the widely held opinion that trade is a despicable and dishonest occupation. He advanced the theory, which to this very day has lost nothing of its correctness and timeliness, *viz.*, that high prices are the result of an increase of the quantity and debasement of the quality of coinage in circulation, *i.e.* he established the principle of the dependence of prices on the value of money, when he wrote:

Hence arise those general and incessant complaints that gold, silver, food, the work of servants, the labor costs of artisans and everything that is in the use of men exceeds the common price, but, heedless, we do not surmise that the general high prices stem from the debasement of money. Actually all prices rise and fall depend on the quality of money.¹⁴

As the *American Economic Review* expressed it:

The importance of Copernicus' monetary essay in the development of economic thought lies in his stress on a sound currency as a factor in the economic well being of a country. No one before him and few writers after him have shown an equal strength on this point. More than 70 years before Gresham's famous letter was written to Queen Elisabeth Copernicus was aware of the fact that bad money drives out good one. Copernicus was also one of the first to notice that there exists a connection between the quantity of money in circulation and its value.¹⁵

¹³ Joseph A. Schumpeter, *History of Economic Analysis*, New York 1954, p. 33.

¹⁴ *Hinc illa vulgaris et perpetua querimonia aurum, argentum, annonam, familie mercedem, opificum operam et quidquid in humanis usibus est, solitum transcendere pretium sed oscitantes non expendimus omnium rerum charitatem ex vilitate monete provenire. Crescunt enim ac decrescunt etiam omnia ad monete conditionem.*

¹⁵ J. St. Lewiński in the *American Economic Review*, Vol. XV, year 1925, pp. 532-533. (However, it should be noted that Copernicus published his study 32 years and not 70 years before Gresham's letter to the Queen).